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A NEW OPERATION

FOR

ANCHYLOSIS OF THE ELBOW-JOINT.

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A NEW OPERATION
FOR
ANCHYLOSIS OF THE ELBOW-JOINT
RESULTING FROM FRACTURE,
AND RIGIDITY THE RESULT OF UNREDUCED DISLOCATION.

BY

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A NEW OPERATION
FOR
ANCHYLOSIS OF THE ELBOW-JOINT
RESULTING FROM FRACTURE, DISLOCATION, OR DISEASE.

IN cases of injury to the elbow-joint or disease of that articulation in which ankylosis, partial or complete, has resulted, excision of the elbow-joint has long been recognised as a legitimate procedure, the movements of the limb resulting from the excision of this joint being so very much more perfect than those effected when either complete or partial ankylosis impairs the flexibility of the elbow.

The resulting limb, however, in cases of excision for ankylosis, has not, in my experience, been so satisfactory as in those cases where active disease has been the occasion of operative interference. On the one hand, too great a degree of mobility in every direction has been the result; on the other, the union between the divided ends of the bones has been more complete than could be desired, and the movements have been commensurately imperfect. In one case, when the latter condition resulted, I practised re-resection no less than three times, cutting away the osseous textures freely, but on each occasion ossific growth rendered the movements of the limb very unsatisfactory. In the former class of cases (where too great mobility has been the fault), a want of muscular development has apparently formed the chief obstacle to the usefulness of the limb, and the want of controlling power of the *triceps* in extension has appeared to be what was mainly deficient.

These observations had forced themselves upon my attention for

a considerable time, during which I had continued content with the simple operation of resection of the articular surfaces of the humerus, radius, and ulna. The first modification I attempted with a view to saving the insertion of the *triceps*, consisted in performing, in the summer of 1869, in a case of fracture of the end of the humerus, a subperiosteal resection of the elbow-joint. This was effected by a straight or linear incision through the *triceps* and over the olecranon; the insertion of the *triceps* and the periosteal covering of the upper end of the ulna were then turned aside, and the olecranon cut off obliquely, so as to divide the coronoid process as well, and thus detach both the greater and lesser sigmoid cavities of the ulna. The end of the humerus was next cut off by the saw, an excision director having been carried round its anterior aspect, in the groove of which the key-hole saw had free play. These portions of bone having been extracted through the wound by means of sequester forceps, the head of the radius was elipt off by the bone-pliers. The result of this case was not satisfactory, extensive osseous deposit rendering the movements less perfect than was anticipated. I repeated this method, however, upon two occasions, but in both there was too little movement to satisfy every requirement.

In the summer of 1871, I operated upon a boy by a new method, which I conceived would fulfil every indication, so far as the preserving muscular attachments was concerned, and at the same time enable me to effect the removal of as much of the osseous textures as might appear to be necessary. The speculative reasonings which led to my adoption of this method were these:—

It was quite obvious that, as in most cases of fracture into the elbow-joint, the humerus was the bone alone affected; no changes in the osseous structures of the radius and ulna necessarily resulted from any injury the humerus had sustained; nor even should the radius and ulna be involved in the injury, did the resulting efforts at repair constitute a condition which implied any need for their removal by operation. It was also obvious that the removal of the upper extremity of the ulna necessarily impaired the perfection of the muscular attachments, viz., of the *triceps* and the

brachialis anticus, and indirectly the power of the *biceps* in flexing the forearm. It was clearly, therefore, very desirable that neither the radius nor ulna should be interfered with, if removal of the extremity of the humerus alone would suffice to remedy the ankylosis.

The operation I devised for carrying out these theoretical requirements consisted in the following steps:—(1.) A linear incision to be made over the ulnar nerve to the inner side of the olecranon process rather longer than that usually employed in the ordinary excision of the elbow by linear excision. (2.) The ulnar nerve to be turned over the inner condyle by careful dissection. (3.) A probe-pointed bistoury to be introduced into the elbow-joint in front of the humerus, and then behind that bone, and carried upwards, so as to divide the upper capsular attachments in front and behind. (4.) A pair of bone-forceps to be next employed to cut off the entire inner condyle and trochlea of the humerus, and then introduced in the opposite diagonal direction, so as to detach the external condyle and capitulum of the humerus from the shaft. (5.) The truncated and angular end of the humerus to be cleared, turned out through the incision, and smoothed across at right angles to the line of the shaft by means of the saw, whereby (6.) room might be afforded, so that partly by twisting, partly by dissection, the external condyle and capitulum might be removed without any division of the cutaneous tissues on the outer side of the arm.

This operation, it will be observed, by a single linear incision upon the inner side of the arm, enables the operator to drain efficiently the entire area of operation, and through an incision of very moderate limits to remove the entire expanded extremity of the humerus, without interfering with any muscular structures, except those of the forearm, which take origin from the osseous tissues actually excised. The result in this instance was perfectly satisfactory, the movements of the forearm being restored so as to maintain a degree of muscular power not usually observed in cases of ordinary excision of the elbow.

Shortly after this, in August 1871, I operated in precisely the same manner upon a young gentleman suffering from ankylosis of the

elbow-joint, consequent upon a fracture of this articulation. Here not only had the humerus suffered, but in the course of the operation the coronoid process of the ulna was seen to have been broken off, leaving as a result a line of fibrous union traversing the greater and lesser sigmoid cavities of the head of the ulna.

All went on well in this case, till the wound had almost healed, when chronic osteomyelitis of the humerus set in, and a rigidity began again to return, which resisted diligently-maintained passive motion effected under the influence of chloroform. In these circumstances I again opened up the line of incision, and found that a long spike of new bone, developed from the granulation tissue, which projected from the cancelli of the centre of the divided surface of the humerus, had become united to the surface of the ulna. This projection, along with half an inch more of the shaft of humerus, I then cut off.

After this the wound healed, and the movements of the forearm became steadily restored.

In the same week I operated upon a lad sent to my care from Caithness-shire, who had met a severe injury to the elbow-joint by falling from a roof. I practised the same operation I have described, and had the satisfaction of obtaining a most perfect result.

I have since then operated upon two female patients and a child in precisely the same manner and with equally satisfactory results.

I have thus practised this mode of operation in six cases in all. With a single exception, a satisfactory result accrued immediately from the operation. In this single case, when an attack of osteomyelitis supervened upon the operation, and osseous union was threatened between the humerus and bones of the forearm, the secondary removal of a further slice of the humerus afforded an ultimately satisfactory issue.

The merits of this operation, which, so far as my observation and reading go, is an original one, consist—(1.) In leaving the attachments of the *triceps* and *brachialis* undisturbed, affording therefore a degree of leverage in the movements of the forearm, which cannot be attained when the olecranon, or any portion of the upper end of the ulna, are interfered with or removed. (2.) In limiting the area

of operation almost exclusively to within the capsular ligament of the elbow-joint, which seems to secure more speedy healing of the wound than would otherwise occur. (3.) In securing, by the line of incision being internal and posterior, less ultimate surface deformity, a more direct drain for discharge, and a more ready access to the ulnar nerve than by any other method.

One objection only can be taken to this mode of procedure, viz., that it does not afford a ready access to the external lateral ligament of the elbow-joint; this, however, is of trivial importance, if the plan of procedure I have laid down be rigorously carried out in the division and removal of the end of the humerus, viz., 1. The oblique division of the condyles of the humerus from above downwards, so as to cut through the articular surface by means of bone-pliers between the trochlea and capitulum of the humerus. 2. To cut off the capitulum and external condyle obliquely from the shaft by means of pliers applied from below upwards. 3. To turn out the end of the shaft and cut off as much of its truncated and conical extremity as may be deemed requisite; and, lastly, to dissect and twist away the capitulum and external condyle from their remaining ligamentous and other attachments.

It may be urged, that while this may be easy enough when there is only partial rigidity of the elbow-joint, it is impossible to effect it in cases of complete and absolute ankylosis of the elbow-joint. But such an objector must not fail to recollect, that absolute ankylosis of the osseous kind is not a common result of fracture into the articulation, especially when passive motion has been attempted to be kept up after the accident; that in most of these cases it is rather due to the altered form of the osseous surfaces resulting from the fracture and displacement, and that at most the ankylosis is usually fibrous in its character.

Again, even were it present, forcible flexion and extension under chloroform will, in the great majority of cases, effect such a degree of solution of continuity as will enable the operation to be carried out in the manner already described without any real difficulty. Should any case occur of very dense osseous union of the articular surfaces, rendering the risk of fracture of the olecranon or of the

shaft of the humerus a reasonable danger possibly involved in such strenuous effort, then a transverse section of the humerus with bone-pliers through the condyles, excision of a portion of bone above this level, and piecemeal excision of the anchylosed condyles themselves, by means of the forceps and gouge, would afford an alternative means calculated to remove any ordinary difficulties; while the conversion of the operation into a complete excision of the elbow-joint may always be had recourse to should insuperable obstacles be found to prevent the execution of the more limited resection.